ATCO NEWSLETTER

VOLUME 5 NUMBER 1 JANUARY 1988

IT'S TIME TO RENEW YOUR ATCO MEMBERSHIP!

Unless you renew your ATCO membership, this is your last issue of the ATCO Newsletter.

You will find details concerning ATCO membership listed on page nine of the October 1987 newsletter.

****

HAPPY NEW YEAR!

****

****

The ATCO Newsletter is the official publication of a group of television amateurs known as "AMATEUR TELEVISION IN CENTRAL OHIO" and is published in January, April, July, and October.

Membership in ATCO is open to any FCC licensed radio amateur who has an interest in amateur television.

TAKE A LOOK AT ATCO IN 1987

We believe 1987 was a good year for ATV, and a review of ATCO's activities would be of interest to you.

During an October 1986 ATCO Tuesday Night Net, the question arose as to what might be done to stimulate more interest in ATV in Columbus and the surrounding area. One suggestion was to resume publication of a newsletter. For this purpose, one volunteer stepped forward, and you are now reading the fifth consecutive ATCO Newsletter issued quarterly since January 1987.

Another suggestion was to reorganize ATCO on an informal basis (see ATCO Newsletter vol. 4, no. 1, page 2). Again, we found ATV hams willing to volunteer to assist in getting the word about ATCO to prospective members and to be Tuesday Night ATCO Net Managers.

At first, response to joining ATCO as a dues paying member was not too great - only a handful of ATV operators submitted applications and checks. About the middle of February, a few more ATVers joined making the total ten. Then more operators gave us their support; by the end of March, ATCO boasted a membership of 19. As April, May, and June went by, we picked up four additional members.

Plans for an Antenna Measuring Party were discussed along with the idea that such an event would give us the opportunity to socialize and enjoy our common interest. Almost immediately after publicizing the party, the membership list increased to 35. The 19 September ATCO get-together was a successful undertaking (see October 1987 issue of the ATCO Newsletter). As of 31 December 1987, ATCO had 43 members!

Many of our members were increasingly involved in both air and land mobile ATV activities. The WB8ELK balloon launch got our attention as did WB8URI's DX operation. WB8TMP gave us ATV participation on Field Day.

Several ATV stations installed vertically and horizontally polarized receiving and transmitting facilities. Additonal ATVers began operating on 1270 MHz, and the Dayton ATV Repeater was improved.

Throughout the year, the ATCO Tuesday Night Net continued to provide us with an on the air meeting place, and the opportunity to share our ideas with each other.

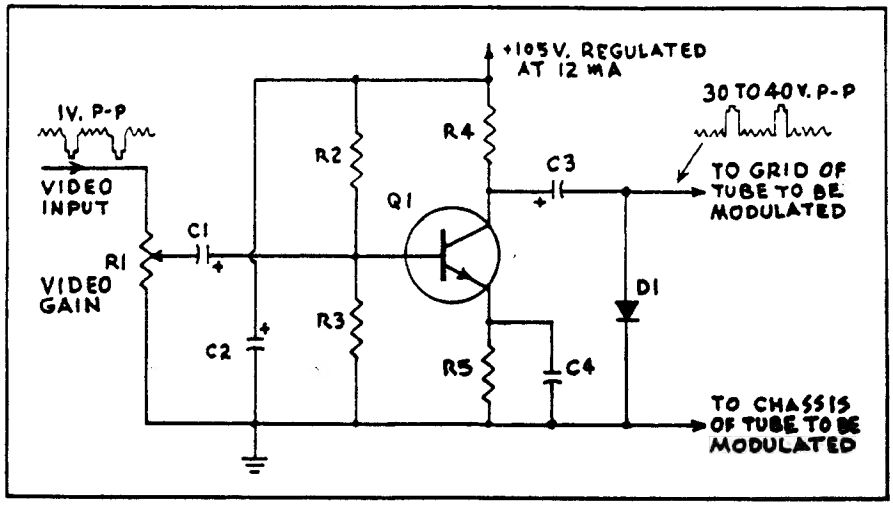
Many informative technical articles were written by our members and were published in the ATCO Newsletter. At year's end, plans were underway for a technical meeting to be held in the early spring. Such a meeting should help us to increase our knowledge of amateur television.

ONE TRANSISTOR VIDEO MODULATOR

A schematic diagram for a one transistor video modulator for grid modulating small to medium power tubes for ATV is shown below. This circuit modulates the 5894 final in an RCA CMU 15 with good results.

The input video gain control should be adjusted so that the ouput power is about two-thirds of the maximum power when the final was unmodulated. (Submitted by Guy, K8HVA.)

[A four transistor video modulator employing negative feedback will be included in the April ATCO Newsletter. - Ed.]



SCHEMATIC FOR ONE TRANSISTOR VIDEO MODULATOR

C1 - 100 uF, 25V dc, electrolytic
C2,C3 - 8 uF, 150V dc, electrolytic
C4 - 470 pF
D1 - diode, 1N4001
Q1 - transistor, 2N3440, 2N5058, or RS-276-2038. A heat sink should be added to insure a long usage life.
R1 - 100 ohms, video gain
R2 - 100 k ohms
R3 - 1 k ohms
R4 - 5.6 k ohms, 2 watts
R5 - 47 ohms

****

REMINDER

Have you checked the expiration date on your ham license recently? If it is time to renew (approximately 90 days prior to expiration), then attach a photocopy of your license to a completed FCC Form 610 and mail to FCC, P.O. Box 1020, Gettysburg, PA 17326. Your license will be renewed for a period of ten years.

****
NEWS DEADLINE FOR APRIL ATCO NEWSLETTER IS 15 MARCH 1988!
****

NEW ATCO MEMBERS

Since the October issue of the ATCO Newsletter, eight new members have been added to our roster.

We welcome the following:

Dave, KB2ARL	Emmett, WA8ATF	Joe, W8BBW	George, WB8JDV
Bill, KN8DMK	Tom, WD8OBT	Jack, W8VSY	Bill, KB8UU

****

JANUARY ARITHMETICKLER

Did you notice that the "Arithmeticker" has a new name? This month, you are getting a chance to win a solid state high resolution black and white 14 inch TV monitor - how about that? Thanks to Bill, W8FRQ, for donating the prize to ATCO. Contest rules are listed below.

For those who solved the ATCO Newsletter's October Arithmetickler "in their heads," this one may require a little more profound cogitation - good luck!

The combined ages of Bill's and Dave's ATV transmitters total 44 years. Bill's is twice as old as Dave's was when Bill's was half as old as Dave's will be when Dave's is three times as old as Bill's was when Bill's was three times as old as Dave's. How old is each transmitter?

CONTEST RULES: You must be listed on the 31 December 1987 ATCO Membership List to be eligible to enter. The earliest postmarked correct solution to the January Arithmetickler (above) mailed to the ATCO Newsletter Editor will be declared to be the winner of the TV monitor. In the event of a tie, Bill, W8FRQ, will conduct a drawing to determine the lucky ATVer. The contest winner must pick up his prize at W8FRQ's QTH.

****

OUR CONTRIBUTORS

Thanks to the following ATV hams for their contributions to this issue of the ATCO Newsletter.

Guy, K8HVA, a first time contributor, for his "Antenna Stacking Formulas" and the "One Transistor Video Modulator" article.

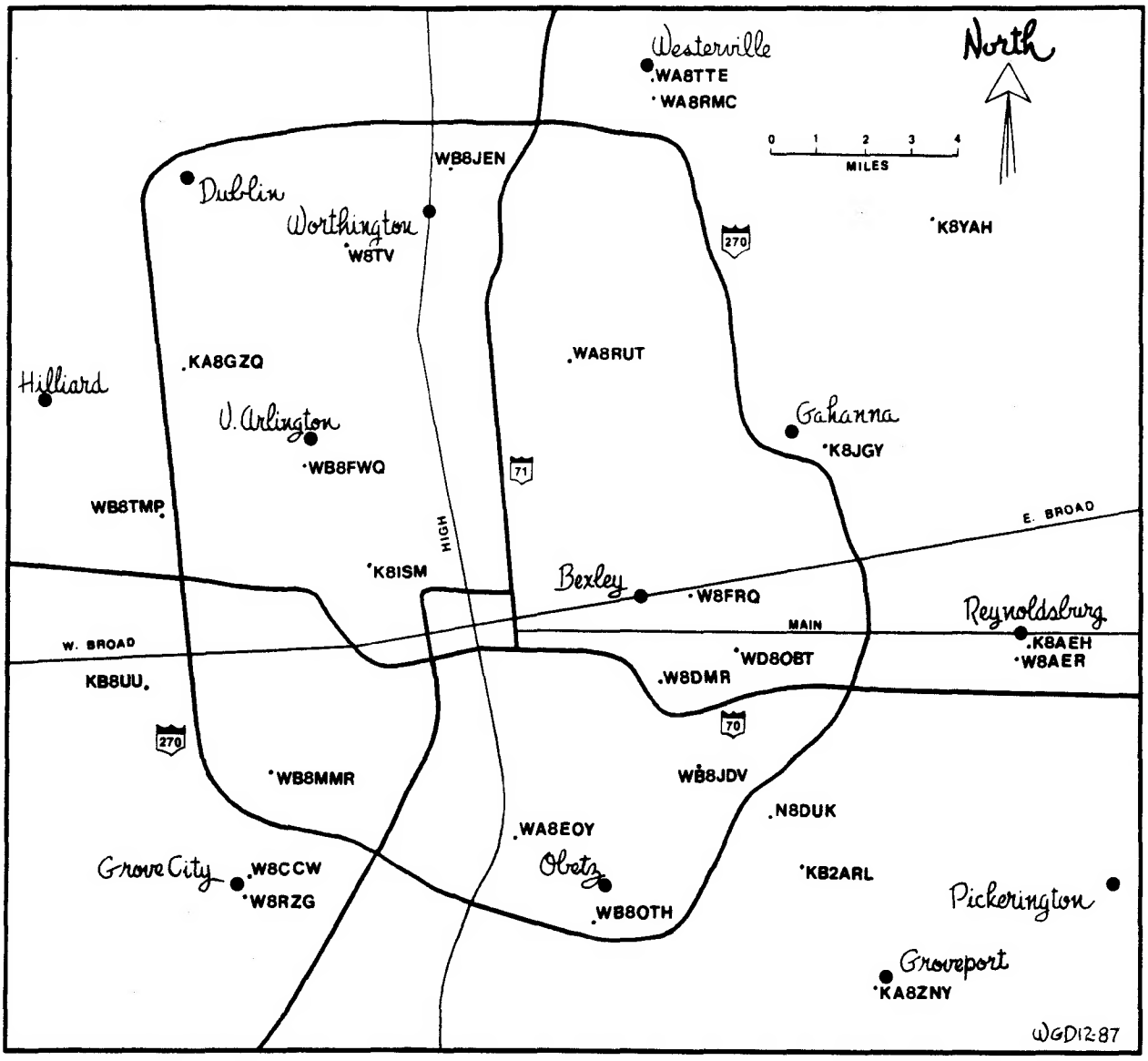
Bill, W8FRQ, for keeping our brains working with his "Arithmetickler."

Dave, KB2ARL, another first time contributor, for "Vidicon Tube Basics."

Bill, W8DMR, for "Relating Noise Figure to Noise Temperature" and several interesting ATV news items.

ATCO ATV STATION MAP

COLUMBUS AND FRANKLIN COUNTY STATIONS



****

A WORD ABOUT THE STATION MAPS

The above ATCO ATV station map and the one on page nine of this issue of the ATCO Newsletter have been prepared to assist you in locating stations in the ATCO viewing area. Locations of stations in Columbus and Franklin County are considered to be reasonably accurate but not precise. Post office locations were used for stations outside of Franklin County.

It is suggested that you plot headings on these maps for future use in beaming your antenna.

SOLUTION TO OCTOBER ARITHMETICKLER

Did you get $50.50 as the cost of the wattmeter and $24.50 for the ohmmeter? If not, here's how the problem can be solved:

Let x = cost of wattmeter — Equation 1: x + y = $75
Let y = cost of ohmmeter — Equation 2: x - $26 = y

Substitute value of y in Equation 1 for y in Equation 2:

x - $26 = $75 - x

Collecting terms: 2x = $75 + $26
x = ($75 + $26) / 2
x = $50.50

From Equation 2: y = x - $26
y = $50.50 - $26
y = $24.50

****

ANTENNA STACKING FORMULAS

Physical frontal antenna area is not the same as effective electrical area! To obtain stacking distance, first calculate the effective electrical area of the antennas to be stacked. Stack the antennas so that the adjacent sides of the apertures do not overlap. A formula for the effective aperture (Ae) is:

$$Ae = \frac{Gi \times (WL)^2}{4 \times pi}$$

Where: Gi is the power gain of the antennas in reference to an isotropic radiator.
WL is the wavelength for the frequency of operation.

If the antenna power gain is referenced to a dipole, use the formula below:

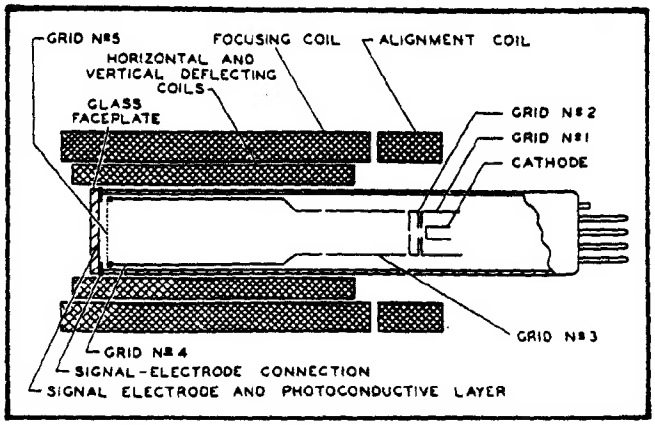
$$Ae = \frac{1.64 \times Gd \times (WL)^2}{4 \times pi}$$

The above formulas are for antenna gains that are not in decibels. A dipole has 1.64 times the gain of an isotropic radiator which is also 2.14 dB. The effective aperture (Ae) will be in the same units of measure selected for wavelength (WL). (Submitted by Guy, K8HVA.)

****
THE ATCO TUESDAY NIGHT NET MEETS EVERY WEEK AT 8 EST AND 9 EDT
****

VIDICON TUBE BASICS

Nearly all TV cameras use the vidicon tube and its variations. The vidicon consists of a flat glass window at one end, called the "target" of the tube, and an electron gun at the other end. Inside the window, a coating with a transparent conductive material is applied. Then a thin transparent photoconductive layer is placed over this coating. The photoconductive layer is electically connected to a conductive metal ring on the outside of the envelope to which a stable positive voltage is applied. The main elements of the vidicon tube are shown in the drawing at the right.



The conductivity of the target material is proportional to the amount of light falling on it. The gun side of the target is then scanned by a low velocity electron beam which provides an analog electrical version of the light image focused upon it. This output signal is capacitively coupled to the input of the video preamplifier. In most vidicons, the target coating material is an amorphous antimony trisulfide referred to as an N-type semiconductor.

Several important vidicon tube characteristics directly affect the quality of the TV picture. These are:

1. OUTPUT LEVEL AND NOISE. Obviously, a tube should have an output signal that is great enough to produce good quality video. If the output level is too low, noise will be introduced into the signal by the electronics when the signal is amplified.

2. DEFINITION OR RESOLUTION. The tube should be able to detect the fine detail of a scene. This is a function of both the tube and the accompanying circuity.

3. FOCUS UNIFORMITY. The scene should be in focus over the entire phototarget. Although this can easily be obtained optically, the focusing of the beam as it scans the target is more difficult.

4. SHADING. This effect is caused by a higher signal level output from some parts of the target than from others. The result is some parts of the picture (usually at the edge of the target) appear as though they are in the shade.

5. LAG (IMAGE RETENTION). Lag occurs in all vidicons. When the camera is moved or an object moves in a scene, a "ghost" of the subject may remain in position on the screen and slowly fade away after several scans. If a camera remains in one position for a long period of time, the image may be permanently burned into the target. (continued on page 10)

RELATING NOISE FIGURE TO NOISE TEMPERATURE

Johnson noise, defined as a nonperiodic AC voltage fluctuation and in reality an effect of electron agitation, places a limit on the ultimate sensitivity of amplifiers, mixers, and preamplifiers. All high frequency transistors whether FET or bipolar devices, as well as all passive elements, reach a well-defined performance based on this effect.

Historically, transistors have been categorized by their noise figure (NF). The lower the noise figure, the better the device. But two decades ago within the confining technology of ultralow noise parametric amplifiers and hydrogen masers, another measure of performance was developed. This parameter, termed noise temperature, has established industry acceptance.

What does noise temperature really mean? Also how does one convert from noise figure specifications to noise temperature specifications to make comparisons?

At absolute zero, -273.18 deg. C., Brownian movement (hence electron agitation) ceases, and Johnson noise equals zero. Normal room temperature is generally regarded as 20 deg. C. Universal scientific consent has established the standard noise temperature at 290 deg. Kelvin (To). Active components such as transistors, however, can exhibit noise temperatures different from their operating or ambient temperatures. This exhibited noise temperature is termed the device's effective input noise temperature (Te).

Another relevant term in understanding noise temperature, input available noise power (P), is calculated as $P = k\ T\ B$, where k is Boltzmann's constant ($k = 1.38 \times 10^{-23}$); B is bandwidth in hertz; and T is absolute temperature in degrees Kelvin.

The total noise output power (Np) of an active transistor is, in effect, the sum of the input noise plus the noise contributed by the device. Thus: $Np = G\ k\ B\ (Tin + Te)$. G is device gain.

Because a device's noise figure is by definition the ratio of the total noise power to the input noise power, when the input termination is at the temperature of 290 degrees Kelvin, $NF = Np/(G\ k\ B\ To)$.

Combining the two previous equations produces an expression for the relationship between noise figure and effective noise temperature: $NF = 1 + Te/To$.

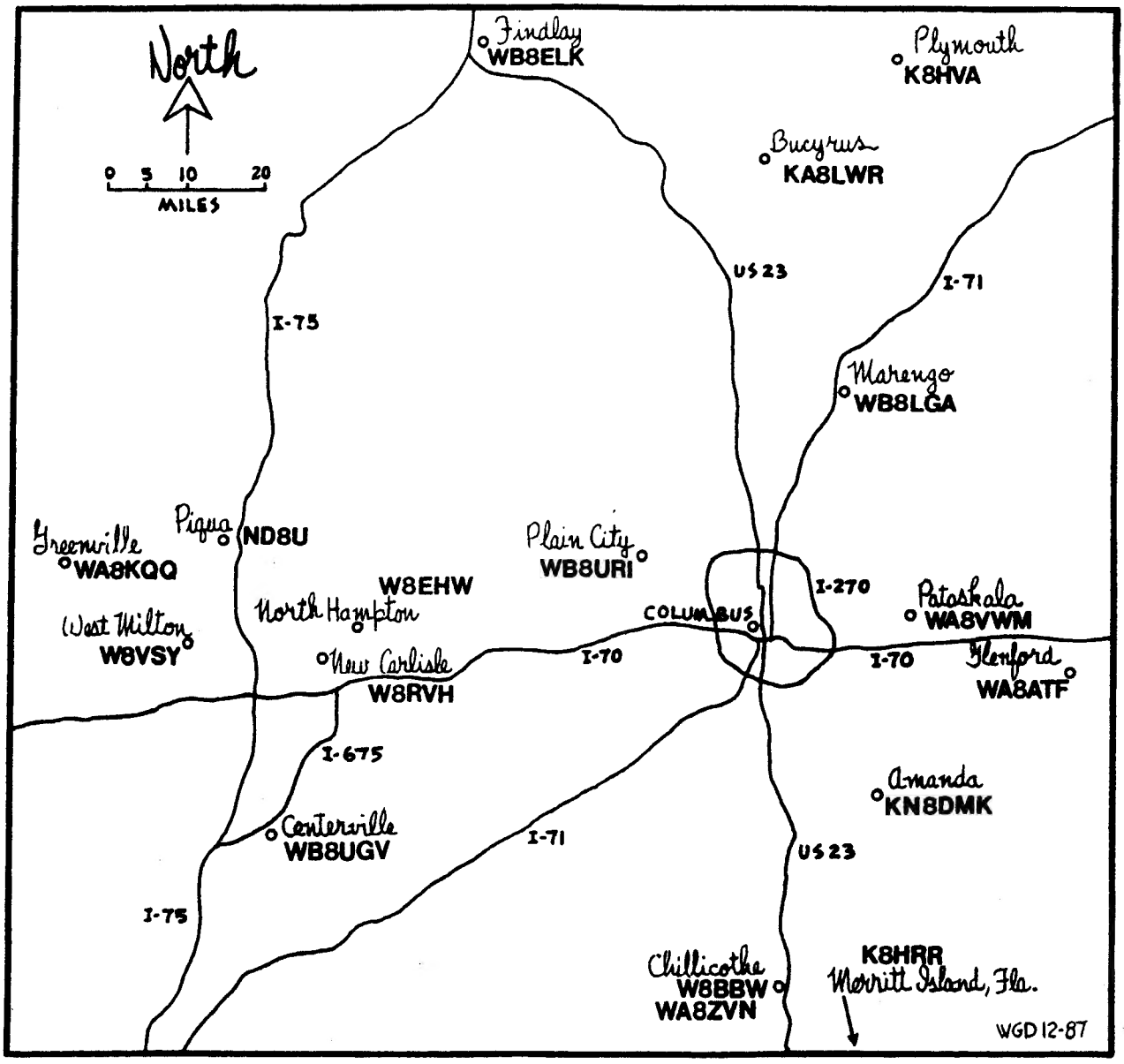
Finally, the noise figure is generally expressed in decibels so when expanded this expression yields $NF(dB) = 10 \log (1 + Te/To)$.

Therefore: $Te = 290\ (\text{antilog}\ (NF/10) - 1)$ deg. Kelvin.

To put this expression into perspective, consider a GaAs FET preamp with a noise figure specification of 2.7 dB. What is its noise temperature? Answer: The effective noise temperature is, Te = 250 deg. Kelvin. (Submitted by Bill, W8DMR.)

ATCO ATV STATION MAP

STATIONS LOCATED OUTSIDE OF FRANKLIN COUNTY



****

ATV NEWS ITEMS OF INTEREST

ATCO MEMBERS ATTEND AMSAT CONFERENCE - Bill, WB8ELK, Perry, WB8OTH, and Tom, KA8ZNY, recently attended the AMSAT Conference in Detroit. They report fast scan ATV may be transmitted from the next space shuttle scheduled for 1988 or 1989. Tom made a video tape during one conference forum where AM versus FM ATV modulation was considered for the mission.

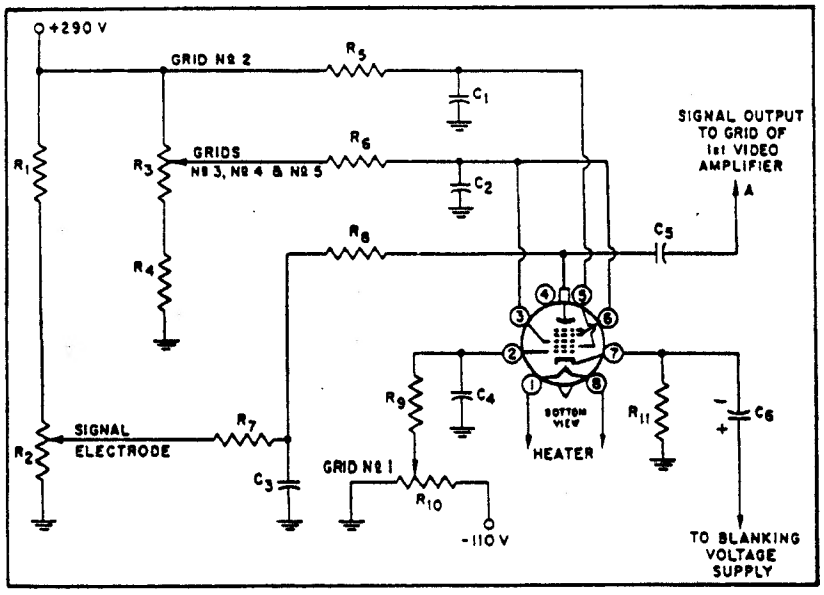
10-PIN CAMERA CONNECTOR - Another supplier of this connector has been found. Panasonic uses the part number VJS-25 which is the female chassis mount connector.

VIDICON TUBE BASICS

(continued from page 7)

Most of the five conditions listed on page seven can be controlled by the voltages applied to the grids. Generally, picture quality increases with higher voltages, and most cameras are designed to supply 250 volts or more. Also, as a vidicon tube ages, higher target voltages are required to produce an adequate output signal.

Typical vidicon circuitry is shown in the schematic drawing below. Surplus vidicon tubes can be found in flea markets at most hamfests and are therefore relatively inexpensive. (Submitted by Dave, KB2ARL.)



C1 C4: 0.01 μf, 300 volts (working voltage)
C2: 0.1 μf, 300 volts (working voltage)
C3 C5: 0.1 μf, 200 volts (working voltage)
C6: 4 μf, electrolytic, 300 volts (working voltage)
R1: 120000 ohms, 1/2 watt
R2: 100000-ohm potentiometer, 2 watts
R3: 50000-ohm potentiometer, 2 watts
R4: 70000 ohms, 1/2 watt
R5: 5000 ohms, 1/2 watt
R6: 10000 ohms, 1/2 watt
R7: 200000 ohms, 1/2 watt
R9: 50000 ohms, 1/2 watt, non-inductive
R9: 100000 ohms, 1/2 watt
R10: 500000-ohm potentiometer, 2 watts
R11: 1000 ohms, 1/2 watt, non-inductive

TYPICAL VIDICON CIRCUITRY

****

RENEW YOUR ATCO MEMBERSHIP TODAY!

****

1.2 GHz ATV TESTING CONTINUES

During October, November, and December, the following ATV stations have been active on 1.2 GHz:

W8DMR	N8DUK	W8EHW	WA8EOY	WA8RUT
W8RVH	WA8TTE	WB8UGV	WB8URI	K8YAH

Dick, W8RVH, has been conducting narrow band tests using his modified R-7000 receiver and has received signals from N8DUK, WB8URI, and WB8UGV. John, WA8EOY, is now transmitting good color pictures with his modified APX-6 World War II surplus transmitter. The video modulator diagram for the APX-6 is shown in the October 1987 issue of the ATCO Newsletter.

ATV NEWS ITEMS OF INTEREST

By Bill, W8DMR

ATCO GETS NATIONWIDE ATTENTION - Spec-Com Magazine published several articles in their November 1987 issue which originally appeared on pages three, six, and seven of the January 1987 ATCO Newsletter. If you are a reader of Spec-Com Magazine, please note the reversed placement of the schematic diagram and the Line Sampler figure.

BALLOON LAUNCH FOLLOW-UP - WB8ELK's equipment has been found! A farmer found the transmitter and the associated electronic package in a bean field about 20 miles from Findlay. Bill (WB8ELK) has plans to conduct another launch early this year. The balloon launch demonstrated once again that there is no real substitute for antenna height.

THE ATV 10 WATT "BRICK" - Several ATCO members have requested information regarding the availabilty of thick-film linear UHF modules. The price of this component varies from $59.00 to $79.00 (plus shipping cost) and may be obtained from the following suppliers:

P.C. Electronics, 2522 S. Paxson Lane, Arcadia, CA 91006, phone (818) 447-4565 - Toshiba part no. S-AU4.

Richardson Electronics, 116 S. Long Beach Rd., Rockville, NY 11570, phone (800) 645-2322 - Motorola part no. MHW-710-2.

Note: The Toshiba S-AU4 unit lead connections are not the same as those for the Motorola MHW-710-2.

The Amperex module, part no. BGY41B, functions well, also. Does anyone know of a source for these units?

[Other ATV News Items of Interest will be found on pages nine and ten of this edition of the ATCO Newsletter. - Ed.]

****

APX-6 VIDEO MODULATOR CHANGES

The video modulator as described on page six of the October 1987 ATCO Newsletter does not possess sufficent high frequency response to modulate for good color and sound. Since the APX-6 exhibits attenuation of high frequency video at 1200 MHz, the high frequency response of the modulator must be greatly increased.

For quality video and color for the APX-6, the following circuit changes are required:

1. Remove 15 turns from L2 and shunt L2 with a 22 k ohms resistor (RS-271-038).
2. Add a .002 uF capacitor by-pass around R10 (two RS-272-126). (Submitted by John, WA8EOY.)

ATCO MEMBERS AS OF 31 DEC 1987

K8AEH Wilbur Wollerman
1672 Rosehill Road
Reynoldsburg 43068

W8AER David Sears
1678 Kaiser Drive
Reynoldsburg 43068

KB2ARL Dave DiGiuseppe
3841 Evanston Drive
Columbus 43232

WA8ATF Emmett McDonald
14120 Flintridge Rd. SE
Glenford 43739

W8BBW Joe Schumann
5418 Marietta Road
Chillicothe 45601

W8CCW John Ferrell
3722 Wagner Court
Grove City 43123

KN8DMK Bill Oelker
8460 Bowers Road
Amanda 43102

W8DMR William Parker
2738 Floribunda Drive
Columbus 43209

N8DUK Ron Reynolds
4642 Glengate Drive
Columbus 43232

W8EHW Foster Warren
124 East Clark Street
North Hampton 45349

WB8ELK Bill Brown
12536 T.R. 77
Findlay 45840

WA8EOY John Schlaechter
3199 Lewis Road
Columbus 43207

W8FRQ William Ennis
146 South Weyant Avenue
Columbus 43213

WB8FWQ Christopher Vojsak
2050 Ellington Road
Columbus 43221

KA8GZQ Warren Duemmel
3488 Darbyshire Drive
Hilliard 43026

K8HRR Ira Bickham
260 Tiki Drive
Merritt Is., FL 32952

K8HVA Guy Cunningham, Jr.
31 Birchfield Street
Plymouth 44865

K8ISM Steve Iacono
1075 Virginia Avenue
Columbus 43212

WB8JDV George Martini
3027 Inn Road
Columbus 43227

WB8JEN Bob Mills
6834 Halligan Avenue
Worthington 43085

K8JGY Fred Yost
330 Dellfield Way
Gahanna 43230

WA8KQQ Dale Waymire
225 Riffle Avenue
Greenville 45331

WB8LGA Charles Beener
2548 State Route 61
Marengo 43334

KA8LWR Marlin Alberty
1645 Olentangy Road
Bucyrus 44820

WB8MMR Mike Knies
1715 Winding Hollow Dr.
Columbus 43223

WD8OBT Tom Camm
1267 Arkwood Avenue
Columbus 43227

WB8OTH Perry Yantis
1850 Lisle Avenue
Obetz 43207

WA8RMC Arthur Towslee
180 Fairdale Avenue
Westerville 43081

WA8RUT Ken Morris
3181 Gerbert Road
Columbus 43224

W8RVH Richard Goode
9391 Ballentine Road
New Carlisle 45344

W8RZG Corwin Miller
4966 Haughn Road
Grove City 43123

WB8TMP Dave Bourne
2200 Dividend Drive
Columbus 43228

WA8TTE Phil Morrison
154 Llewellyn Avenue
Westerville 43081

W8TV Bob Dye
6118 Sedgwick Road
Columbus 43085

ND8U Philip Brooks
412 Franklin Street
Piqua 45356

WB8UGV Bruce Jaquish
193 Cherry Drive
Centerville 45459

WB8URI William Heiden
4435 Kaufman Road
Plain City 43064

KB8UU William Rose
439 S. Murray Hill Road
Columbus 43228

W8VSY Jack Schmermund
401 North Main Street
West Milton 45383

WA8VWM Lou Williams
4720 Blacks Road SW
Pataskala 43062

K8YAH Ronald Vanke
5094 Longrifle Road
Westerville 43081

KA8ZNY Tom Taft
386 Cherry Street
Groveport 43125

WA8ZVN Willard Mathuews
221 Black Run Road
Chillicothe 45601

****

ANNOUNCEMENT

Bill, W8DMR, has volunteered to be the Technical Editor of the ATCO Newsletter. His assistance in this capacity is greatly appreciated.

ATCO FINANCIAL STATEMENT

CASH BALANCE:
As of 30 September 1987.....$173.87

RECEIPTS:
Dues.....$160.00

EXPENDITURES:

Printing charges for October 1987 ATCO Newsletter....	$ 33.76
Postage for October 1987 ATCO Newsletter.....	13.26
Printing charges for reprints for new members.....	24.15
Postage for reprints sent to new members.....	5.62
25 postage stamps @.22 each.....	5.50
Misc. costs incidental to publication of newsletter..	8.45
Total.....	$ 90.74

SUMMARY:

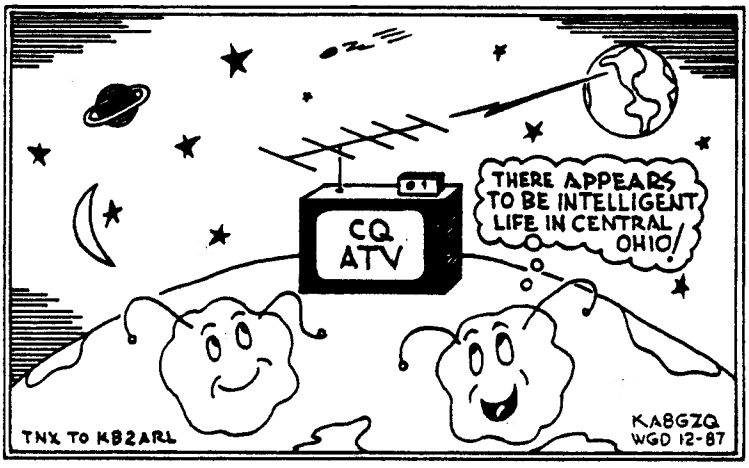
Cash Balance as of 30 September 1987.....	$173.87
Receipts.....	160.00
Expenditures.....	- 90.74
Balance as of 31 December 1987.....	$243.13

22 CENT POSTAGE STAMP INVENTORY:

Stamps on hand as of 30 September 1987.....	10
Stamps purchased 12 November 1987.....	25
Stamps used.....	-12
22 cent stamps on hand as of 31 December 1987.....	23

The above financial report was prepared as of 29 December 1987 by Warren G. Duemmel, KA8GZQ, Acting ATCO Treasurer.

****



****

ATCO MEMBERSHIP APPLICATION

RENEWAL [ ] NEW MEMBER [ ] CHARTER MEMBER [ ] DATE.....
NAME.....CALL.....
ADDRESS.....HOME PHONE.....
CITY.....STATE.....ZIP.....
PLACE OF EMPLOYMENT.....BUS. PHONE.....
HAM INTERESTS.....LICENSE CLASS.....
I WILL TAKE ATCO NET-CONTROL TWICE A YEAR.....[YES].....[NO]
I WILL SUBMIT NEWSLETTER MATERIAL TWICE A YEAR.....[YES].....[NO]
ANNUAL DUES PAYMENT OF $10 ENCLOSED.....CHECK [ ].....CASH [ ]
..Make check payable to Warren G. Duemmel, Acting ATCO Treasurer.
..Mail to KA8GZQ, 3488 Darbyshire Drive, Hilliard, Ohio 43026...

Editor: Warren, KA8GZO
Technical Editor: Bill, W8DMR

FIRST CLASS MAIL

ATCO NEWSLETTER
c/o Warren G. Duemmel
3488 Darbyshire Drive
Hilliard, Ohio 43026

ATCO NEWSLETTER

WIN A 14 INCH TV MONITOR!

SEE PAGE 4 FOR DETAILS